

Special educational services

THE
HEARING IMPAIRED CHILD
IN THE
REGULAR CLASSROOM



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EDUCATION

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THE HEARING IMPAIRED CHILD IN THE REGULAR CLASSROOM

Introduction

Throughout the province there are known to be a number of hearing impaired children attending school in regular classes. Not unreasonably, many teachers feel concerned when a child is diagnosed as having a hearing problem and wonder about their own inadequacies in being expected to teach him. Children who have a severe hearing loss will generally require a very specialized program in a special class or special school for the hearing impaired. However, there will be many children with a less severe hearing loss who will be able to progress satisfactorily in a regular classroom with a little understanding and special consideration from their teacher. Sometimes these children will require a little extra help from a resource teacher which can be provided on an individual basis.

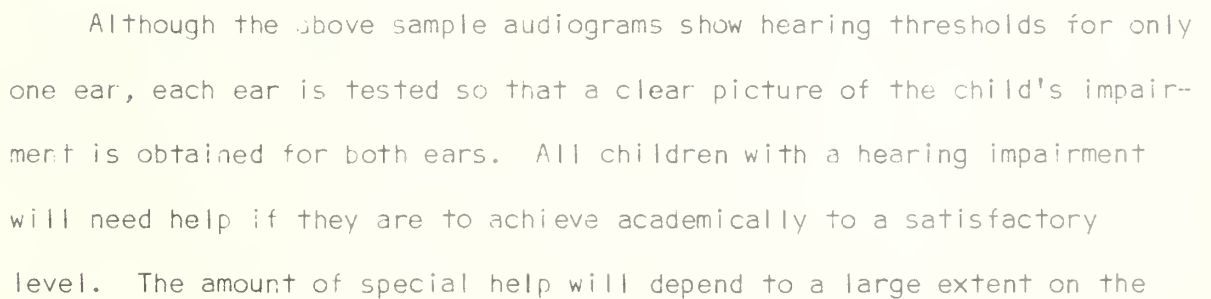
As a general rule mildly hearing impaired children will make better progress if given the opportunity to remain within the regular classroom and will be challenged to make the necessary adjustments to their handicap. Occasionally a more severely hearing impaired child will make sufficient progress with his communication skills that he can also integrate into the mainstream and pursue his education in the regular classroom.

The most critical factor in a hearing impaired child's school progress and development is his teacher and it is to help you to help him that this booklet is presented. What you give this school year will be unique and only you can do it.

WHAT IT MEANS TO HAVE A HEARING LOSS

While it is impossible to truly place ourselves in the situation of a person who hears imperfectly, we can learn about his hearing loss and understand why he speaks somewhat differently and why his language patterns seem a little strange.

When a child is first suspected of having a hearing loss, probably because of his lack of response to gross sounds or speech, and his difficulty in developing language and clear speech, he will be given a hearing test by an audiologist. The audiologist will by means of rather sophisticated electronic equipment establish how well the child can hear at various tones, or frequencies as they are called. This is important because human speech ranges through a variety of frequencies, each particular vowel or consonant having a specific frequency. Obviously, if a child has difficulty hearing a particular frequency he will not pick up readily that particular vowel or consonant sound. A picture of the child's hearing is presented on a graph called an audiogram which will vary considerably from child to child. The following audiograms are typical examples of what one would expect from children having varying degrees of hearing, from no significant loss to profoundly deaf.



degree of hearing loss. The child with a mild to moderate loss will require a different educational approach from that of the child with a severe to profound loss. The latter will most often require placement in a special class or program while the former will be maintained in the regular classroom.

1 From the point of view of the child with the mild to moderate loss, he finds it a little difficult to understand when people around him speak too rapidly, or when too many speak at once. He tries to compensate for his hearing loss by wearing a hearing aid which has been fitted to suit his particular loss. He will also watch closely when people are speaking to him and benefit greatly from speechreading, and picking up clues from facial expressions and normal gestures. Clear, but never exaggerated speech will make the task of listening and speechreading much easier and provide a good pattern to imitate.

Since speech reception for the hearing impaired child is necessarily imperfect his imitation of speech and language will also be imperfect. With patience, understanding and help this will improve. Of utmost importance the child should be encouraged to talk and never be ridiculed for his efforts.

WHAT IS A HEARING AID

Just as several children in your classroom no doubt will wear glasses to correct faulty vision, your hearing impaired pupil will wear a hearing aid. Unlike the eye glasses, the hearing aid usually does not have such corrective properties as to give the child normal hearing. It does however help him to hear better and is an essential tool in his educational equipment. It should be maintained at top efficiency and worn at all times. The aid is an electronic device designed to suit the child's hearing loss as closely as possible. It amplifies sound and has been chosen to give most amplification in the frequencies where he has the greatest loss.

Since the hearing aid is expensive it should be treated with respect. At the same time it is reasonably robust and designed to be used by active individuals, even at play. Maintenance is simple and includes replacement of batteries when amplification drops off, replacement of cord if it is broken, and regular cleaning of the ear mold which will automatically become clogged with wax from the normal secretion of the ear. Any other problems with the aid should be referred to the dealer or supplier from which the aid was bought.

FURTHER INFORMATION ABOUT HEARING IMPAIRMENT

The remainder of this booklet is comprised of specific information about hearing impaired children and particular hints on how you his teacher can help him to succeed. For further information or guidance on developing your program to include a hearing impaired pupil you may contact one of the following Department of Education Consultants for the Hearing Impaired:

Mr. Harvey Finnestad
4th Flr., 10053 - 111 St.
Edmonton, Alberta
T5K 2H8
427-2939

Mr. Henry Minto
Calgary Regional Office of Education
Rm. 1200, Rocky Mountain Plaza
615 MacLeod Trail S.E.
Calgary, Alberta
T2G 4T8
261-5028

HELPS FOR SUCCESSFUL MAINSTREAMING

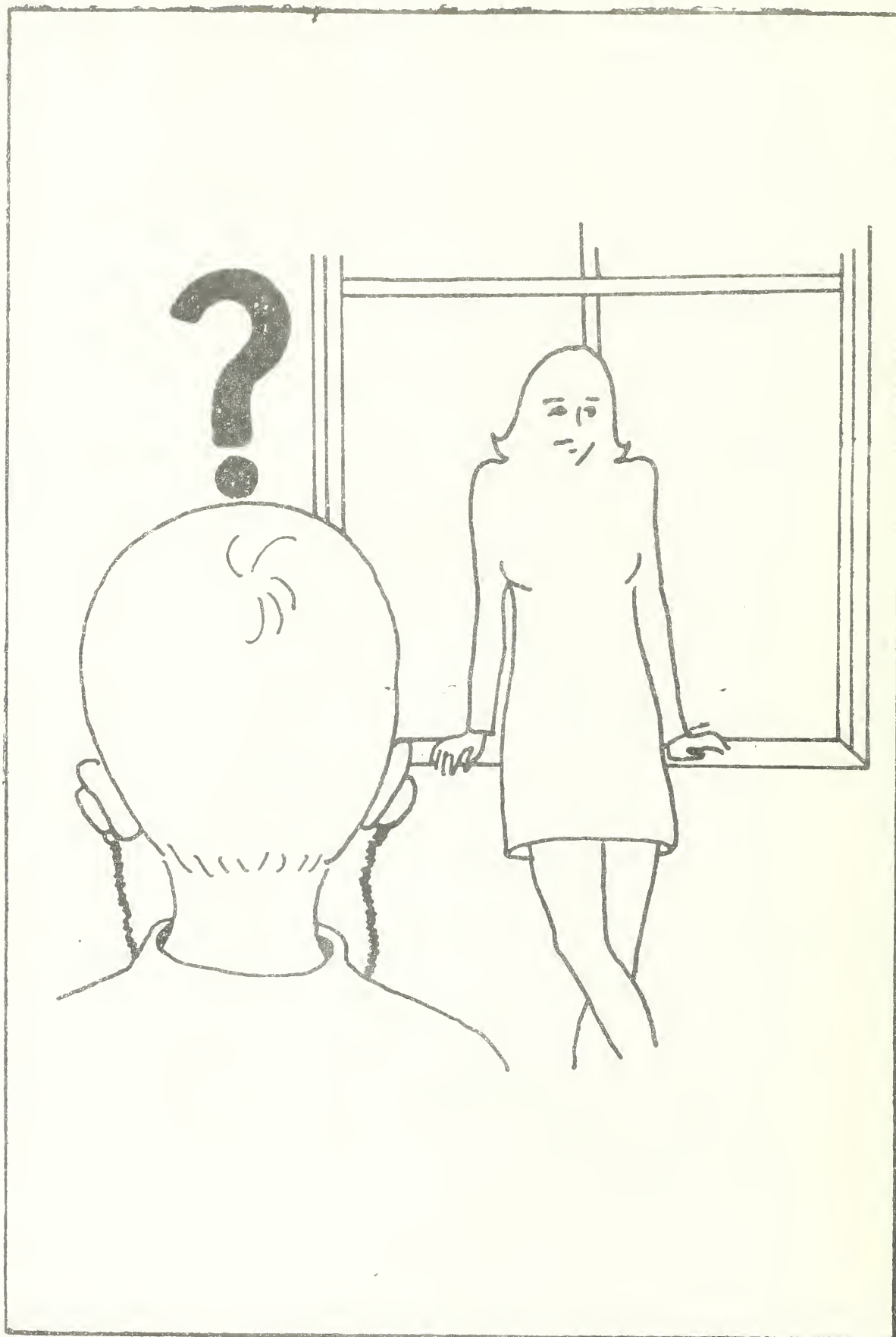
Often teachers or other persons who have not previously known a hearing impaired child are unduly concerned about the problems of communication and the implications of deafness. They realize that the hearing impaired child has special needs but are not confident about their ability to approach him.

As an aid to all concerned with the mainstreaming or integration of hearing impaired children, the following reprint of a simple basic introduction to contact with these children follows. It was prepared by the Madison Association for the Education of the Deaf for this purpose.

I CAN'T HEAR YOU



1. The child must see your face well. If he is small, get down to his level. If he is older, try to be within distance for reading newspaper headlines and where he need not crane his neck or see your face from the side or below.



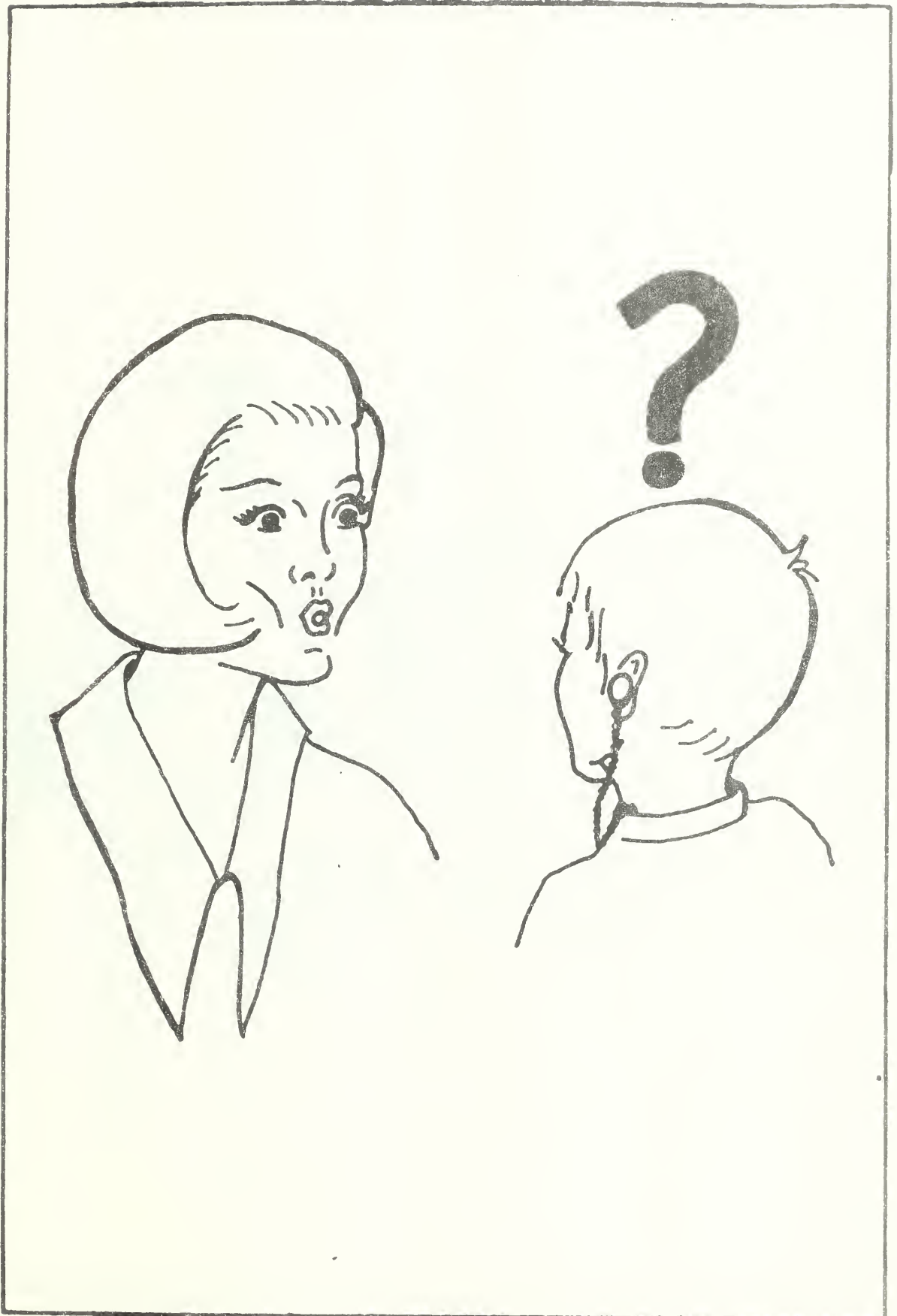
2. Have a good light on your face whenever possible. Do not have the child looking into the light. Not only do you become an empty silhouette but it is very tiring for his eyes.



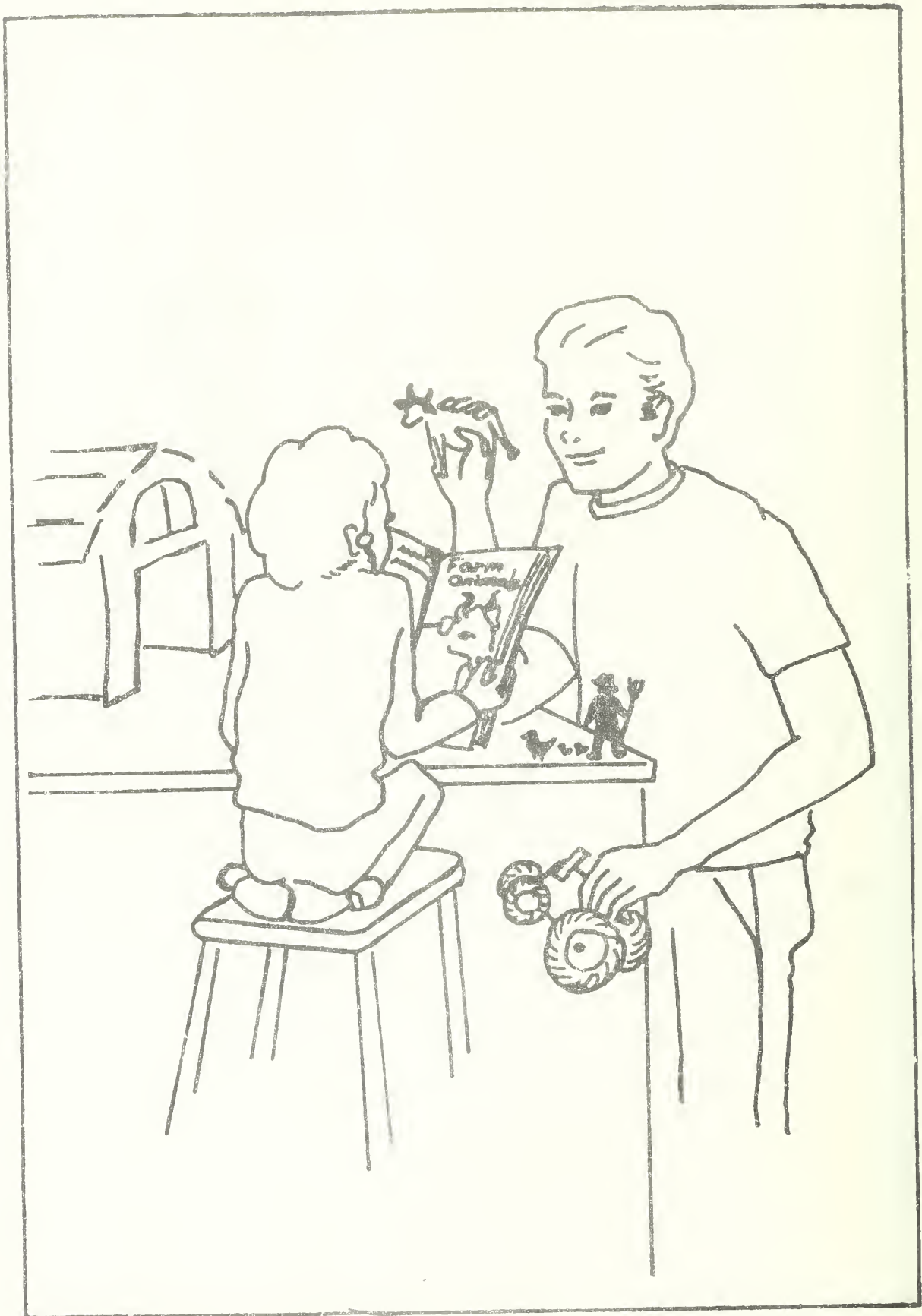
3. Get the child's attention before you expect him to understand what you are saying or even that you are talking to him.



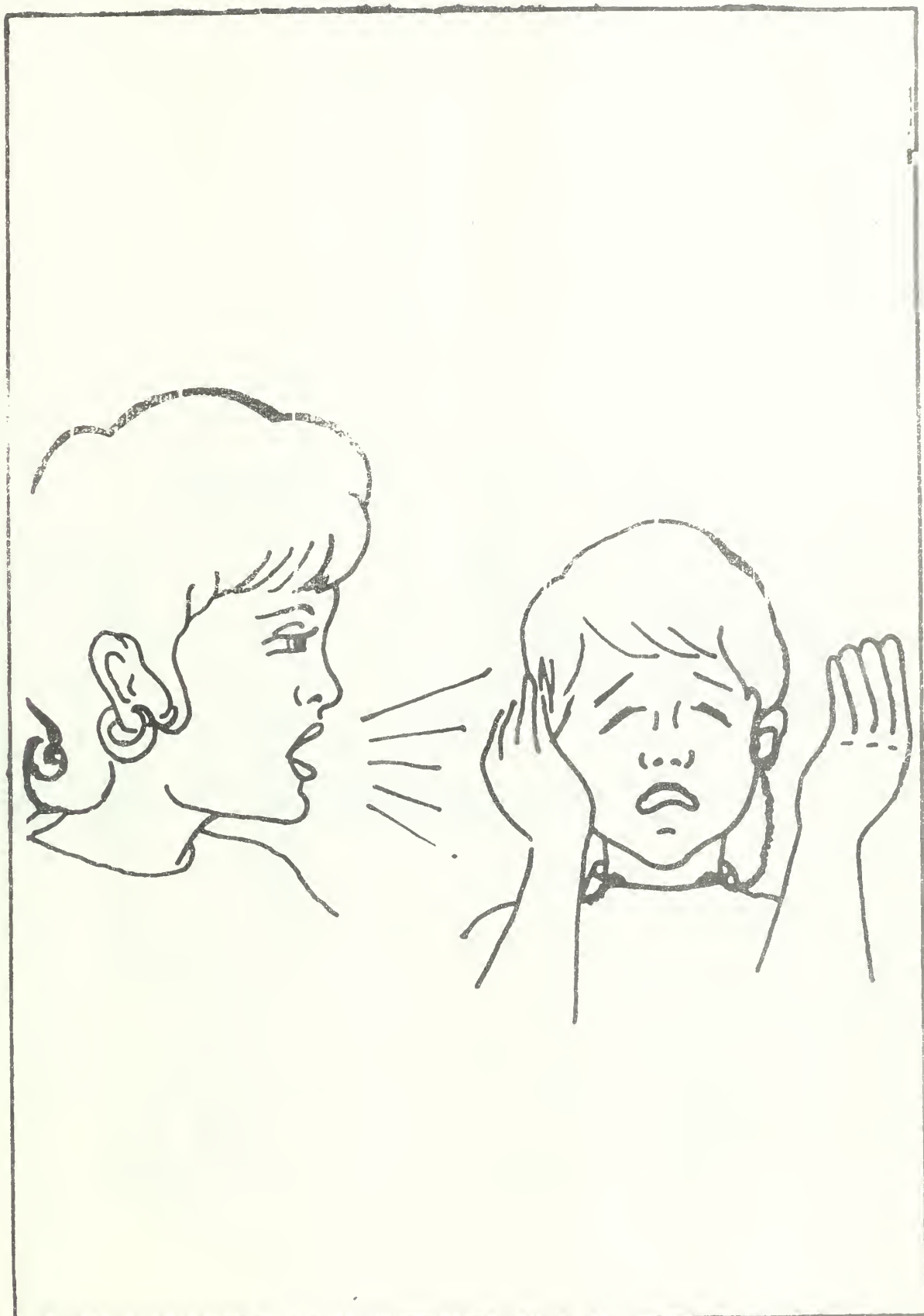
4. Stand still when you talk. Do not turn your face or cover your mouth. No one can speechread a moving blur or the back of a head.



5. Speak naturally as you would to anyone. Do not exaggerate. Re-phrase if the child does not understand rather than repeat the same words over and over.



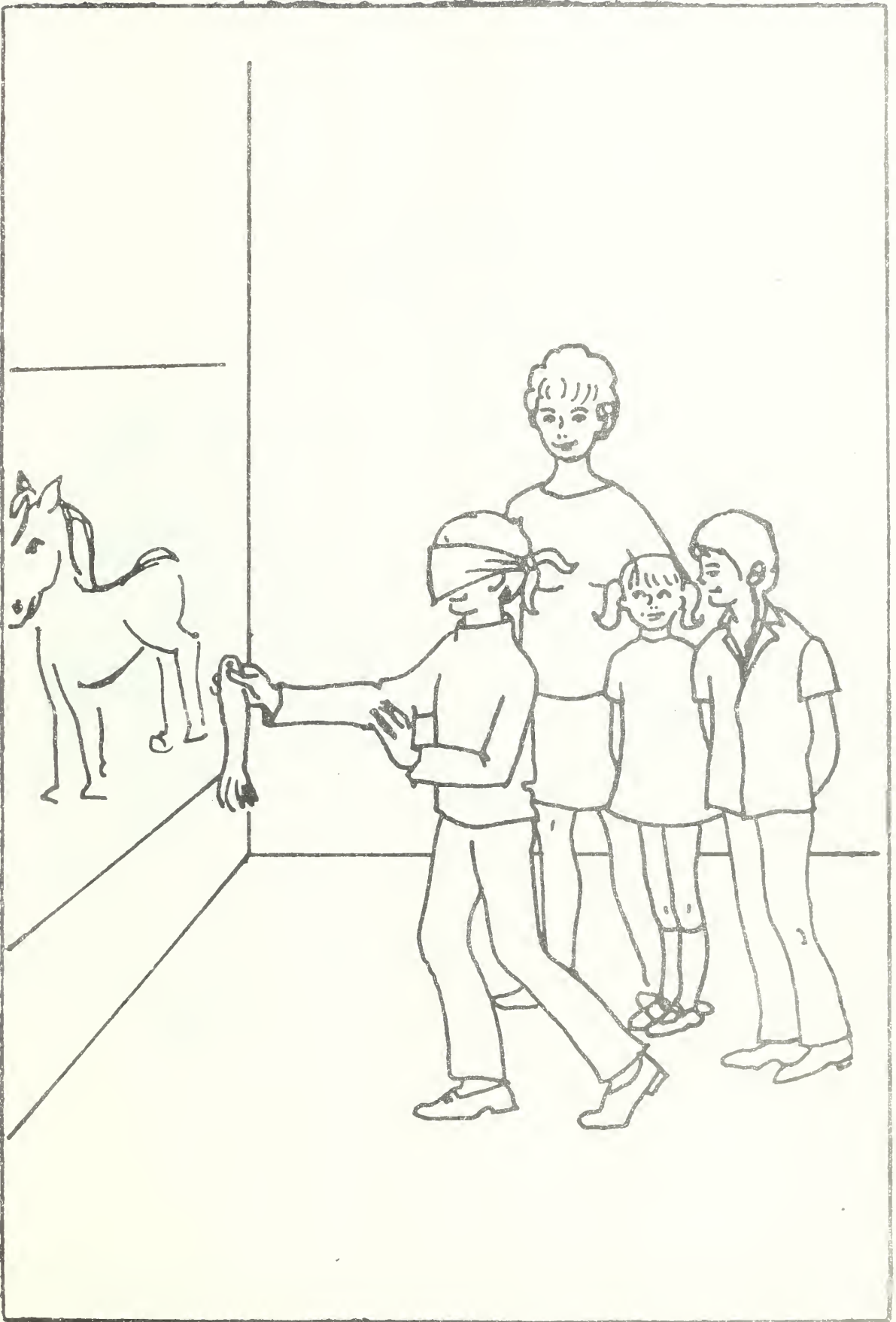
6. Take time to explain things. Give content clues--a written word if he is older, an object or picture if at hand, a familiar reference--to set the stage or to help follow change of subject.



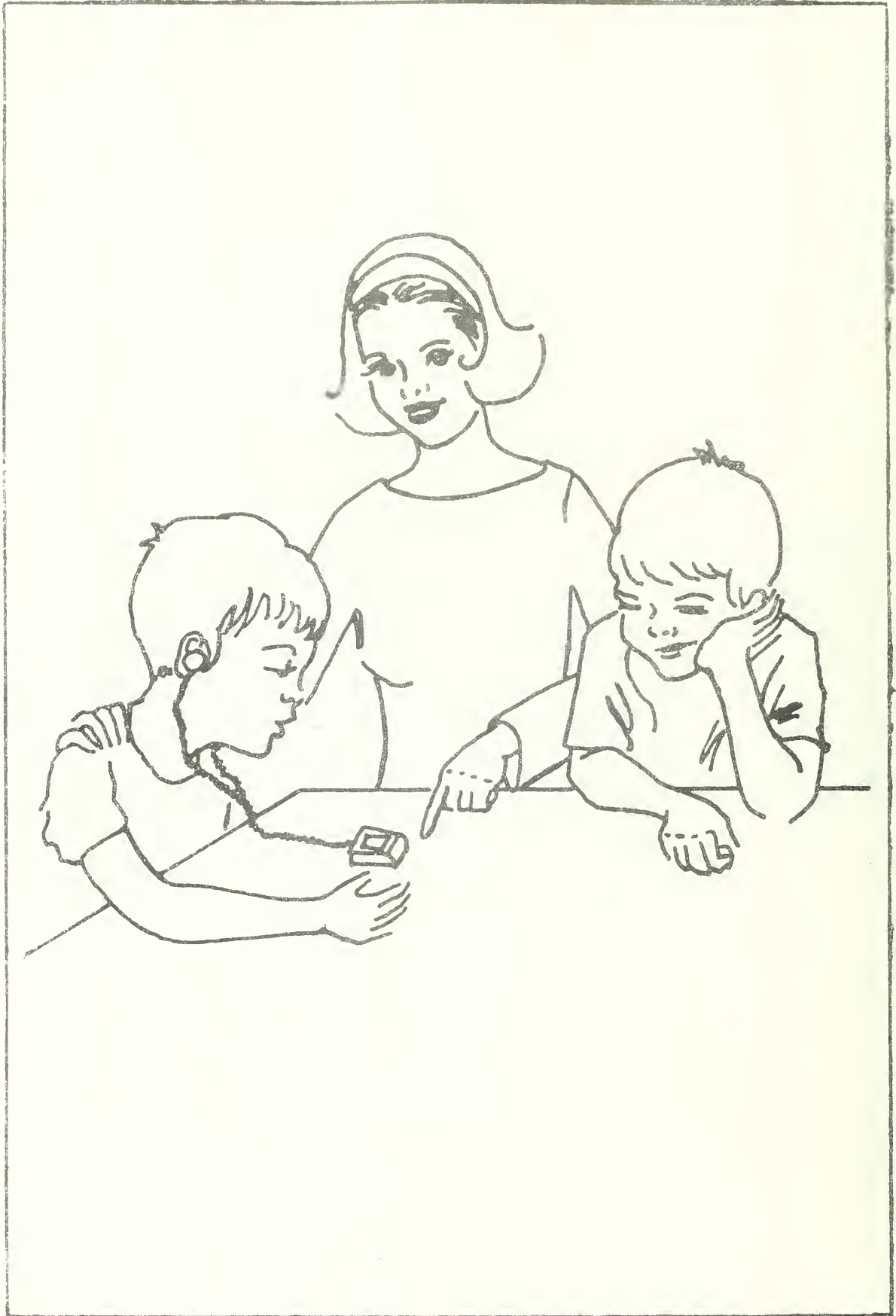
7. The child's hearing aid should be working well at all times! Do not yell. Speak naturally and clearly and his aid will do the amplifying. Even with the best aid, however, he will not hear normally and you can never guess what or how he hears. You can only insure that the best sound possible gets to him.



8. Be aware of the acoustic environment. The hearing aid amplifies ALL sounds and some may blot out speech.



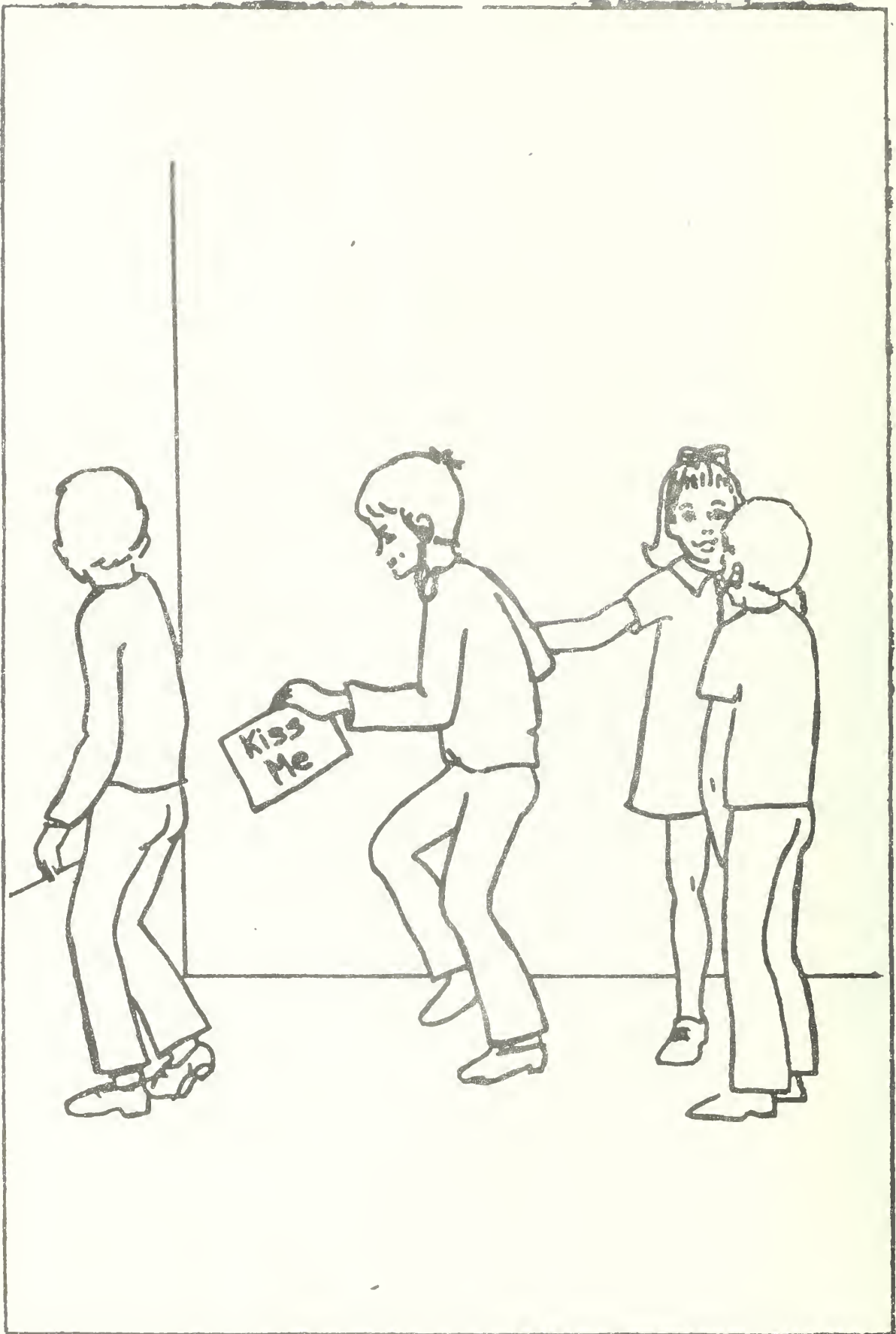
9. Give him security. He may need to be shown, or to be the second or third rather than the first to be asked to perform.



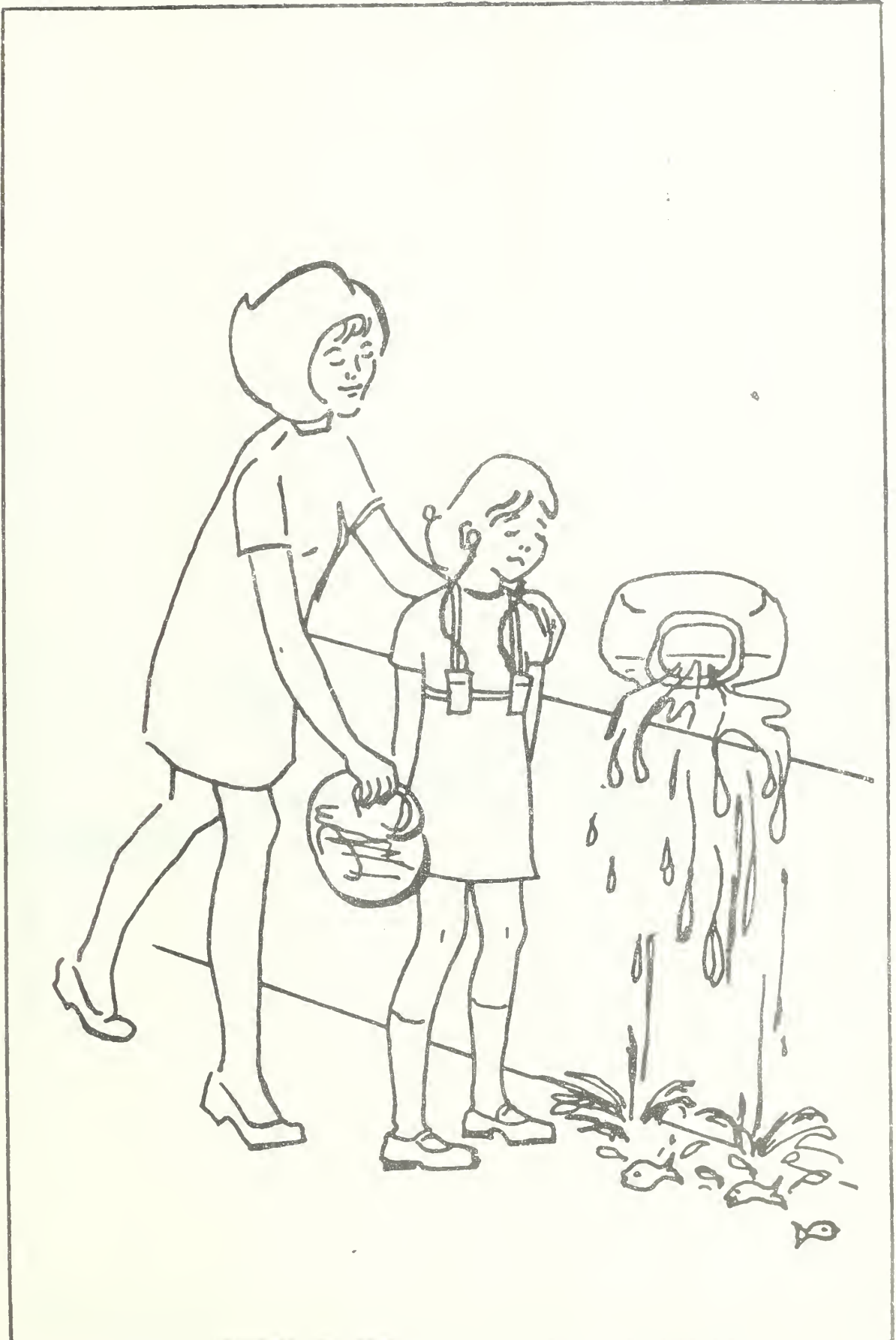
10. Be open about his handicap. You, he and anyone around who is significantly involved all know that he is hearing impaired and might as well act accordingly.



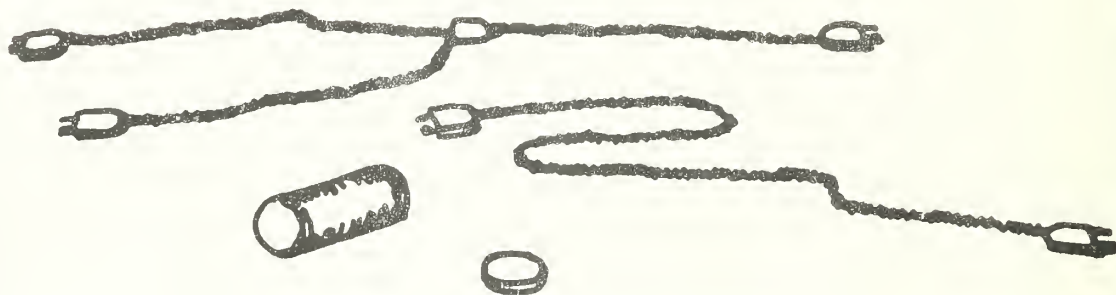
11. Encourage and support him but do not spoil him. He does not need the handicap of being a brat in addition to his hearing impairment.



12. Keep your sense of humor and help the child develop his. Have fun and include him in the fun.



13. Be flexible -- relax!



14. Extra batteries and cords should always be available for hearing aid maintenance.

THE HARD OF HEARING CHILD IN THE CLASSROOM

A GUIDE FOR THE CLASSROOM TEACHER

Phyllis Gildston, Ph.D.

Speech and hearing specialists are faced with the job of helping the classroom teacher understand the special needs of handicapped children. This guide may be shared by the specialist with the teacher who has a hard-of-hearing child in the classroom. There may not be such a child in the school at the moment, but there is sure to be one at some time in the future. The trend is toward placement of the hard-of-hearing child in regular schools, whenever possible, rather than in special schools.

Some of the suggestions in the guide may seem "old hat" to a few teachers or little more than common sense procedures. Some may be repetitious. The guide has been made as complete and yet as uncluttered as possible, so that each teacher can find within it something of use -- even if that something of use -- even if that something is just a new way of viewing the problem.

General Considerations

DO try to accept the hard of hearing child positively -- no matter how inadequate his comprehension, or his vocabulary (unless, of course, there are other reasons for not doing so). Since you often set the

DON'T pamper or overprotect the hard-of-hearing child, however. Don't treat him any differently from another child of his age, intelligence, etc. With only the limitations of his handicap to modify the goals you set for him, he will feel that he belongs.

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Pages 239-245.*

example for the class, your reactions are likely to trigger similar responses in the other children.

DO remember that even two children with *almost identical* hearing losses may function very differently and hence cannot be effectively lumped into one generalized category -- the hard-of-hearing -- for teaching purposes. They must be motivated, taught, and challenged according to their ability to function as total individuals.

DON'T forget that intelligence, social maturity, family background, etc., of hard-of-hearing children vary considerably. Any one or a combination of the above factors may be even more significant than the child's hearing loss in determining his ability to function or to learn -- e.g. don't expect a dull child with a mild hearing loss to do nearly as well as a brilliant child with a profound loss.

DO discover and encourage the hard-of-hearing child's special capabilities and interest just as you would with any normal hearing child who is not top-notch in everything. It is, of course, of great psychological benefit to the youngster to know that he can excel in something.

DON'T assume that the hard-of-hearing child can't be gifted in science or art or poetry simply because he is hard-of-hearing.

DO try to discuss his problem objectively with the class. Children can be much less cruel when they are helped to understand another's problem.

DO make certain that the hard-of-hearing child is *attending* (not just "listening") when you begin new work or when you ask him a question, or when you give him a job.

DO consider instituting the buddy system for hard-of-hearing children. A buddy is a child who can help the

DON'T miss any opportunity to turn the hard-of-hearing child's handicap into an asset. Units in physiology, mechanics, physics, problems in communication, etc., may provide the fulcrum for swinging the attitudes of his classmates in the right direction. The "dross into gold" approach can be adapted at all levels. The content of the motivational material may be as simple as the book, *Tim and His Hearing Aid*, or as complex as a discussion of sound propagation in the secondary school science lab.

DON'T, however, expect continuous attention on his part. Some inattention must be tolerated if you are not to wear the child out. (Remember how tired you were when you returned from that lecture given by a foreign authority and could only get a seat at the rear of the auditorium?)

DON'T expect the hard-of-hearing child to understand at all times no matter how bright he is or how diligently he tries.

hard-of-hearing child with directions he has missed without wasting the teacher's time. The buddy may also "cue him in" should he miss out on some of the class discussions or need notes to copy over at home.

DO try to use many visual aids (you probably do anyway) to increase the number of sensory associations the hard-of-hearing child can store in order to facilitate his learning.

DO be aware that the hard-of-hearing child has special vocabulary limits.

DON'T rely on auditory cues in teaching the hard-of-hearing child.

DON'T assume he starts off with the same vocabulary as the normal hearing child. Many words which normal hearing children use in the course of every day conversation may be new words to the hard-of-hearing child. The normal hearing child has heard multiple repetitions of many, many words without attending particularly to their meaning or to the speaker who uses them. He "absorbs" the meaning. The hard-of-hearing child must learn by attending directly to the speaker and

concentrating on the communication with all of his resources.

DO use some of the slang that is popular with the hard-of-hearing child's peers (within bounds, of course). You may be the link that connects him to the group.

DON'T be a "fuddy-duddy" in your speech or language.

To Help The Child Understand More Adequately Via LIPREADING

DO write on the board without speaking. Then turn back to the class and speak.

DON'T speak with your back to the class at any time.

DO try to articulate clearly and with moderate speed.

DON'T mumble and gallop in speaking. On the other hand, don't exaggerate your speaking pattern in a gallant attempt to make the hard-of-hearing child understand. He has to live with normally speaking people and is taught to lipread (in special classes) normally articulated words.

DO lower your standards for note-taking for the hard-of-hearing child.

DON'T expect the hard-of-hearing child to be able to take decent lecture notes. He can't write and listen as most of us can, but must keep his eyes peeled to the speaker's lips in order to get the gist of what is being said. Don't

DO keep your book down when you read orally. (It's a good example for your students anyway). Good eye contact is important.

DO try to stand fairly still when talking. This may be difficult for you at first but give it a try.

DO try to seat the child so that he may have a clear view not only of your face, but of every other student's face as well.

DO allow the hard-of-hearing child to move his seat or exchange seats with one or two others when he feels this move to be advantageous for comprehension.

expect him to be able to take notes in a darkened room.

DON'T read with your eyes glued to the page.

DON'T perambulate while talking -- particularly if you're giving an oral test.

DON'T seat a child in a class that has a great deal of group and class discussion with thoughts of his reading *your* lips only.

DON'T make the child feel he must be confined to only one location in the room.

DO rephrase a question or message if the hard-of-hearing child does not appear to understand it in its original form. You may be employing words that look and/or sound alike to him but are in reality quite different.

DO write new vocabulary words for any subject on the board and say them for the class to give the hard-of-hearing child a chance to see how these words look on the lips -- or -- give him a list of the new vocabulary words of any topic to take home so that he may practice reading them on his mother's lips.

DO give the child and, if necessary, the child's parents, a preview of topics to be discussed the next day or week so that he (and his parents -- if the child is young) may do

DON'T repeat the same question over and over again in its original form when the hard-of-hearing child appears not to understand. Raising your voice will not necessarily help either.

DON'T expect the hard-of-hearing child to understand new vocabulary words if he is given aural clues and explanations only. (Some may, but many will find difficulty in understanding).

DON'T spring a topic "cold" upon the hard-of-hearing child.

extra work at home to prepare for the coming units.

DO make a blackboard outline of the topic under discussion if the topic you are discussing is particularly complicated, to orient the student after tangential discussions along the way.

DO remember that not all children speak clearly. Hence some are very difficult to lipread. Should something of importance be said or reported by another such child, it would be most helpful to repeat the highlights.

DO remember to put all spelling words into a sentence as so many words look alike to the hard-of-hearing child.

DO try to keep the hard of hearing child within reasonable visual range so

DON'T shift topics without "tuning in" the hard-of-hearing child with verbal and visual connectives and transitions. ("Now we're going to discuss last night's homework." "Now let's move on to our science project.")

DON'T hesitate to repeat for the hard-of-hearing child what another child says even though this is sometimes considered a poor teaching technique.

DON'T be content to give a spelling test in which a list of words is presented without an accompanying *meaningful* carrier sentence.

DON'T expect him to lipread as well from a distance.

that he may read lips without straining his eyes.

To Help The Child Understand More Adequately Via HEARING

DO try to learn something about the extent and nature of the child's hearing loss in order to understand his communication handicap. Although many hard-of-hearing children face similar problems, each hard-of-hearing child's particular hearing disability makes his comprehension problem different.

DO try to learn something about hearing aid and the extent to which the child's hearing aid can help *him* to understand better, e.g. 1) children with moderate losses may benefit much more from a hearing aid than children with either very mild or very severe losses; 2) not all children who have hearing losses can be fitted with a hearing aid without compounding their comprehension problem.

DON'T assume that all hard-of-hearing children hear in the same way. Don't hesitate to consult with the school doctor, nurse, speech and hearing therapist, etc., to get this specialized information. They will be happy to save you the trouble of having to dig it up yourself.

DON'T assume that hearing aids are like prescription eyeglasses -- that wearing a hearing aid can "correct" the child's hearing problem. No hearing aid is completely free of distortion. No hearing aid will permit a child with even a moderate loss to hear exactly as he would hear if he had normal hearing.

DO Learn how to patch up minor breakdowns in hearing aids for the youngest children. It's a cinch to change a battery or cord.

DO seat the child so that if he wears a hearing aid in only one ear he is able to get the best reception not only from the teacher but from most of the children. Remember that with or without a hearing aid, distance from the speaker is a significant factor in the child's ability to understand. The further he is from the source, the more difficult it is to receive the message.

DO reduce the noise level in the classroom at various times throughout the day to give the child with the hearing aid some respite from listening. The hearing aid is not selective and even a highly skilled listener may experience undue tension after a long session of listening in intense ambient noise.

DON'T imagine you have to be a mechanic to do simple repair work on hearing aids. It may mean the difference between a useful or a wasted day for the hard-of-hearing child if you can make these simple repairs.

DON'T assume that just because the hard-of-hearing child is wearing a hearing aid he can be seated anywhere in the room and hear as well.

DON'T assume the hard-of-hearing child can focus upon important sounds in the environment and ignore background noises as successfully with his hearing aid as the normal hearing child does with his ears.

DO speak in a natural tone of voice. Only with certain types of losses will raising the voice have any effect.

DO remember that assignments which require a very long auditory memory span may not be best suited to the hard-of-hearing child.

DO encourage him to be unashamed if he does not understand and to state his confusion or apprehension immediately.

DO remember that the hard-of-hearing child may not hear as well after he has had a cold and/or sore throat and/or earache. A temporary hearing loss may, after such an illness, be ADDED to the child's permanent hearing loss, thus

DON'T shout. Shouting at someone who wears an aid will either "blast" him out of his seat or distort the sound considerably.

DON'T expect a hard-of-hearing child to remember a long list of items aurally presented. He is never sure whether he has caught all the items correctly since they are in a *list* rather than part of a meaningful context. This task is hard enough for the child with normal hearing.

DON'T become impatient with the hard-of-hearing child who so often comes up to your desk "just to make sure" he understands.

DON'T assume that a hard-of-hearing child's inattentiveness or inability to follow class work after an absence is necessarily due to "laziness" or to his having missed certain lessons. The child may be functioning with a temporarily greater loss than usual. Not all parents of hard-of-hearing children are

further complicating his hearing problem for days or weeks after the respiratory infection has subsided. Weather conditions may also contribute to fluctuations in hearing level.

DO remember that children who have been tested at the beginning of the year and who have been found to have *normal* hearing may also develop temporary hearing losses after respiratory infections. You may be the first to notice the loss. You should refer the child to the nurse for another hearing test. Such an awareness on your part may save the child from sustaining a permanent loss due to ignorance or neglect.

aware that additional losses may follow ear, nose, and throat infections. Should you suspect a loss of this nature, ask the nurse to run another hearing test on the child; for if the hearing level has dropped considerably, the nurse will want to keep the child under close surveillance. A temporary loss may become permanent if it persists and is not treated by an ear specialist.

DON'T assume that the child reported to have *normal* hearing cannot develop a hearing loss during the year. If the child's behavior, in terms of comprehension and the ability to follow directions, appears to be significantly impaired after an illness, the possibility of such a loss should always be investigated.

DO remember that a child with specific allergies may have normal hearing most of the time. On certain days, however, his hearing may be impaired. The season, certain foods, and environmental stress may all contribute to temporary hearing difficulties.

DON'T feel that all children who complain of not hearing well on one day or who don't seem to be attending as they ordinarily do are necessarily delinquent or falsely exonerating themselves.

To Help The Hard-of-Hearing Child Communicate More:

Adequately Via SPEECH

DO remember that most hard-of-hearing children do not hear many of the sounds we hear (particularly sounds like s, f, th). Furthermore, many of the sounds they *do* hear come through in a distorted manner. Hence many of them will have a speech impediment. Although the speech therapist will probably help the child to acquire and correct omitted or defective sounds, you can help by following through in

DON'T be discouraged if years and years of outside speech help bring only slow improvement. The hard-of-hearing child has to learn consciously to feel and remember many of the correct articulatory patterns which normal hearing individuals acquire **unconsciously** through the medium of sound. Of course, you won't wish to interrupt communication with constant corrections. Wait until he has finished what he has to say and then, if you find it opportune, you

the classroom. Occasionally, remind the child to use the sounds he is working on in his speech classes when he is with you.

DO compliment him when he does manage to use correctly the sounds he is working on.

DO remember that although some hard-of-hearing children shout, many will speak with inadequate projection and flow of tone. Reminders to speak up and to reach out to the back of the room when he talks will help the child to project more adequately.

DO give him as much opportunity to speak -- if at all possible -- as any other child in the class.

can inform him of his errors.

DON'T think success is its own reward in this case -- unless the success is called to his attention. Often, after all his hard work, he cannot hear his own improvements but must depend upon the listener to let him know when he's right.

DON'T accept either shouting or inaudibility from the child. He *can* be taught, with your help, to modulate his voice and project efficiently.

DON'T make him feel inferior by "protecting" him from speaking assignments.

A HEARING IMPAIRED PUPIL IN THE CLASSROOM

Winifred H. Northcott, Ph.D.

A teacher confronted for the first time with the presence of a severely hearing impaired child in the classroom may not know how to handle the situation in such a way that the child will be effectively integrated into the class. A balance must be achieved so that the hearing impaired child will have the opportunity to receive the maximum benefit from the experience and the normal classroom procedure will not be impeded.

Conditions Affecting Hearing and Learning

The audiogram, in itself, does not determine the hearing impaired child's potential for success or failure in an integrated setting in a local school district. Some of the contributing factors are: age at onset of loss, degree of loss in the speech range, quality of parent-child relationships, lipreading ability, personality, and availability of supplemental instruction services provided by an academic tutor or developmental reading specialist as well as the services of a speech clinician.

Full-time use of an individual hearing aid, when prescribed, is essential for effective classroom participation. It enables a student to hear individual speech sounds more adequately, makes their production more accurate, and supplements the limited clues supplied by lipreading. An extra hearing aid battery should be kept in school at all times.

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1972*

A pupil's hearing loss will fluctuate, complicated by severe colds in wintertime. The thresholds of audibility will vary sharply during a school day. The reverberations of sound present in a group discussion make listening difficult in contrast to the one-to-one relationship when supplemental instruction is being provided. The hearing aid magnifies all sounds equally and auditory discrimination of speech sounds is a gradual developmental process. Afternoon fatigue, particularly in young children, often contributes to added difficulty in comprehension during the afternoon hours.

The result of a fluctuating acoustic environment is that the hearing impaired child may require good lipreading clues and more repetitions than usual in certain situations. When the vocabulary and conceptual content of your conversation are familiar to him, his response will be more appropriate. At other times, when he misses the substance of what is being said, he will appear to be inattentive or misbehaving.

Securing Class Co-operation

Your tolerance, humor, and affection for children are essential for successful integration of the hard-of-hearing or deaf child in social and academic activities. The other pupils in your class will be quick to mirror your attitudes toward him. The expression on your face, your muscle tension, and subtle actions will be eloquent silent testimony as to whether you regard this youngster as an interloper or an interesting addition to the class.

In the primary grades, children respond quickly to a simple explanation of the problems that accompany a hearing loss. In the upper

grades, the student should be consulted about his role and his wishes in such an undertaking. You might read in a whisper from an unfamiliar book to demonstrate the difficulty of relying on lipreading clues and imperfect hearing. A class might enjoy compiling a list of "look alikes" for the word *pan* (*p*, *b*, *m* and *t*, *d*, *n*, are identical on the lips). Other words are invisible on the lips (*onion*, *king*, *egg*). A sentence should be rephrased, if it is not understood initially, to include words with higher visibility.

A pupil, not hearing the total conversation may make an inappropriate remark or give an answer not pertinent to the topic under discussion. Children may have to wait until the hearing impaired classmate looks at them before speaking.

Let your pupil share in the original decision of classroom seating, with opportunity to change if his first choice has proved unwise. Ideally, the seating should be flexible, with one desk located near the blackboard for the pupil to slip into when oral demonstrations are being given. For the music period, let the hearing impaired pupil stand near the piano, his hand resting lightly above the keyboard, facing the piano player and the class. In this way, he can keep pace with the words and music.

If there is a unilateral hearing loss, the pupil should be seated so that the ear with normal hearing is toward the majority of the class.

Optimum Conditions for Learning

Appoint a "listening helper" (to be rotated) to sit next to the hearing impaired pupil to ensure his turning to the correct page in a

workbook or textbook. Homework assignments should be kept in a small notebook, with the pupil being responsible. This will be reviewed by you at the end of each day for accuracy.

Good lipreading conditions require that the light be on your face and out of the pupil's eyes; your hands be away from your face; and that there be a distance of three feet between you and the child. Eighteen inches is an ideal listening distance for the child.

Although you are proceeding at the pace appropriate for the average student in your room, it will help the hard-of-hearing child if you write key phrases or vocabulary words on the blackboard. At times, you may wish to rephrase the material to ensure greater comprehension.

When dictating spelling words, use them in sentences to provide additional clues for comprehension.

Expect your hearing impaired pupil to contribute to oral discussions daily, in reduced and appropriate degree. Accept his imperfect expressive language, repeating it with corrections, or making mental note to discuss the problem with the supplemental tutor and speech clinician.

Encourage your hard-of-hearing pupil to let you know when he doesn't understand. A nod or smile does not always indicate comprehension; a periodic check is necessary in the form of a question requiring a substantive reply.

This youngster may need extra help in understanding the rules of a game in physical education or on the playground. He should not be

permitted to have the passive role of a bystander in group activities.

Successful integration into a class of hearing children requires that a hard-of-hearing or deaf child be independent, persistent, adaptable, and socially mature as well as academically competitive. Your influence should be strong in every facet of his growth and development.

Parental Responsibility

Invite the pupil's parents to visit school regularly so they can realistically assess their child's abilities and appreciate the extra guidance and support you provide him in the classroom.

Members of the family should reinforce, through home stimulation, the vocabulary and concepts encountered in school. The emphasis should be on useful, idiomatic language and natural conversation revolving around attitudes, activities, and interests of the hearing impaired child. Parents will vary in their ability to cope with these challenges or to follow your recommendations.

Regular visits to the school and neighborhood library are desirable. It is also well to encourage hobbies which promote resourcefulness and creativity. At the secondary level, a student must supplement the incomplete notes and understanding of a day's teaching by reading the assigned textbook chapters at home. Reading for pleasure and comprehension is necessary also.

An Annual Evaluation

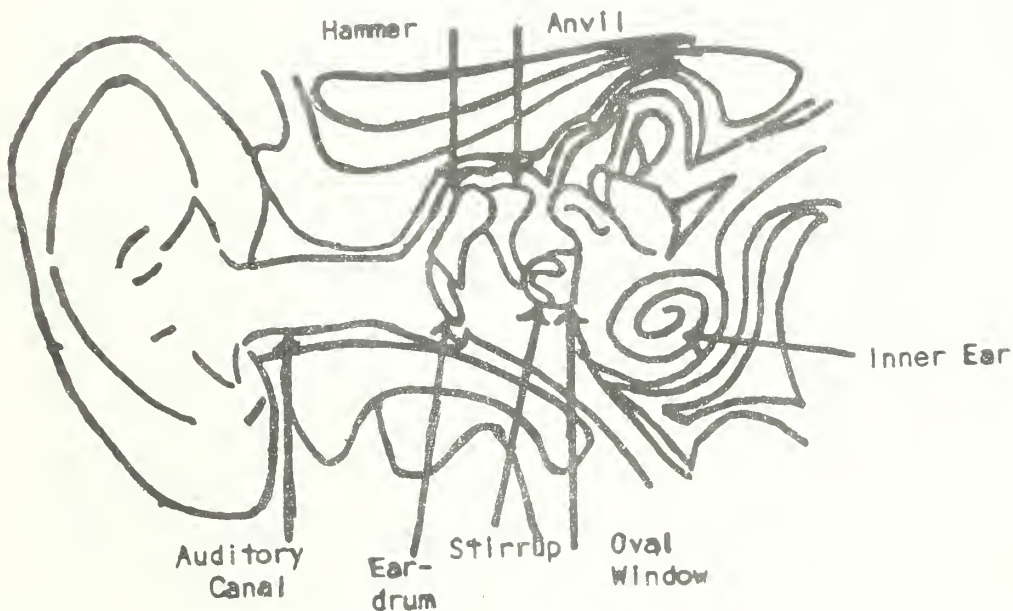
It is essential that the classroom teacher, supplemental tutor-

audiologist, and speech correctionist participate in a comprehensive evaluation of the hearing impaired child each spring to determine appropriate placement for the following academic year. Consideration of the social maturity, academic achievement, intellectual potential, hearing aid usage, and personality of the pupil will highlight the appropriateness of the present academic environment or the need for change.

WHAT CAUSES HEARING IMPAIRMENT

Samuel Moffat

Our ears are energy converters. They receive the mechanical energy of sound waves, or vibrations in the air, and change them into electrical signals the brain can comprehend. When the ear is defective it sends weak and/or distorted signals to the brain.



The ear has three basic parts. The outer ear is simply a funnel that carries sound inward. It is made up of the fleshy ear on the outside of the head and the canal that leads inward from there. At the end of the canal is the eardrum, which marks the border between the outer and middle ear. The middle ear is a small cavity not much bigger than the eraser on a pencil. This cavity contains three tiny bones -- hammer (maleus), anvil (incus), and stirrup (stapes) -- the

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last being the smallest bone in the body. The bones are connected to each other and transmit mechanical vibrations from the eardrum to the fluid of the inner ear (cochlea). This fluid carries the vibrations throughout the spiral-shaped length of the inner ear, which is lined with microscopic hairs. The fluid vibrations cause the hairs to bend, which in turn creates electrical signals. The electrical signals set off a chain reaction of nerve impulses leading out of the inner ear, to the fibers of the hearing nerve, and ultimately to the brain -- where we perceive hearing.

Each part of the ear is subject to damage that can destroy, distort, or weaken hearing. The outer ear can be obstructed by wax or some foreign object, such as a bean or a wad of cotton, or just by swelling and pus from an infection. Functioning of the middle ear can be impaired by congenital malformations, by infection, by fluid in the middle ear, or by bony overgrowth (otosclerosis) that keeps the stirrup from moving freely. When defects such as these block sound vibrations before they are delivered to the inner ear, the hearing loss is known as conductive.

Sometimes sound is conducted to the inner ear, but an abnormality there, in the hearing nerve or even in the brain, prevents the proper electrical signal from being generated, transmitted, or received. This is known as a sensory-neural hearing loss, which may also be called nerve deafness or perceptive deafness. If an individual has a combination of conductive and sensory-neural hearing losses, his defect is known as mixed loss.

With a conductive loss, sounds of all frequencies are muffled, as

if you covered your ear with your hand. A sensory-neural loss, on the other hand, affects certain frequencies more than others; often high-pitched sounds are harder to hear, and this alters the ability to understand certain speech sounds. Both kinds of losses are found in children.

Two principal causes of hearing loss during childhood are otitis media, or inflammation of the middle ear, and serous otitis media, which is non-infected fluid filling the middle ear. Childhood diseases such as measles, German measles, scarlet fever, whooping cough, mumps, and meningitis can produce sensory-neural losses. Fortunately, immunization can now prevent most of these diseases.

More frequent are hearing defects existing at birth, which may be due to genetic factors, to prenatal disease or trauma, or to fluid in the middle ear. According to Freeman McConnell and Paul H. Ward in their book *Deafness in Childhood*, more than half of childhood hearing problems (57 per cent) are due to known genetic conditions. About a quarter can be traced to identifiable disease or trauma, either during pregnancy or after birth. The remaining 18 percent result from undiagnosed disease or genetic factors that have little chance of appearing in the parents' other children.

Rubella, or German measles, is one of the principal diseases responsible for congenital hearing losses. When a woman has rubella during the first three months of pregnancy, even though she may not be sick enough to know it, there is about a 20 percent chance her child will have a serious abnormality. It is during these months that the child's nervous system is undergoing major development. Sensory-

neural hearing defects occur in about two-thirds of the children affected by rubella before birth, and they are also susceptible to middle-ear infections. It is hoped that wide-spread use of the rubella vaccine will prevent exposure of unprotected pregnant women to the German measles virus.

Other conditions that may also affect the hearing of a new-born are premature delivery and Rh blood type incompatibility. The incidence of prematurity may be reduced somewhat by thorough prenatal care. The consequences of Rh incompatibility may be avoided if Rh-negative women receive a suitable injection of blood serum after the delivery of each Rh-positive baby (or after an Rh-positive miscarriage).

HEARING AIDS: Questions Concerning Use and Care

by T. S. Tweed
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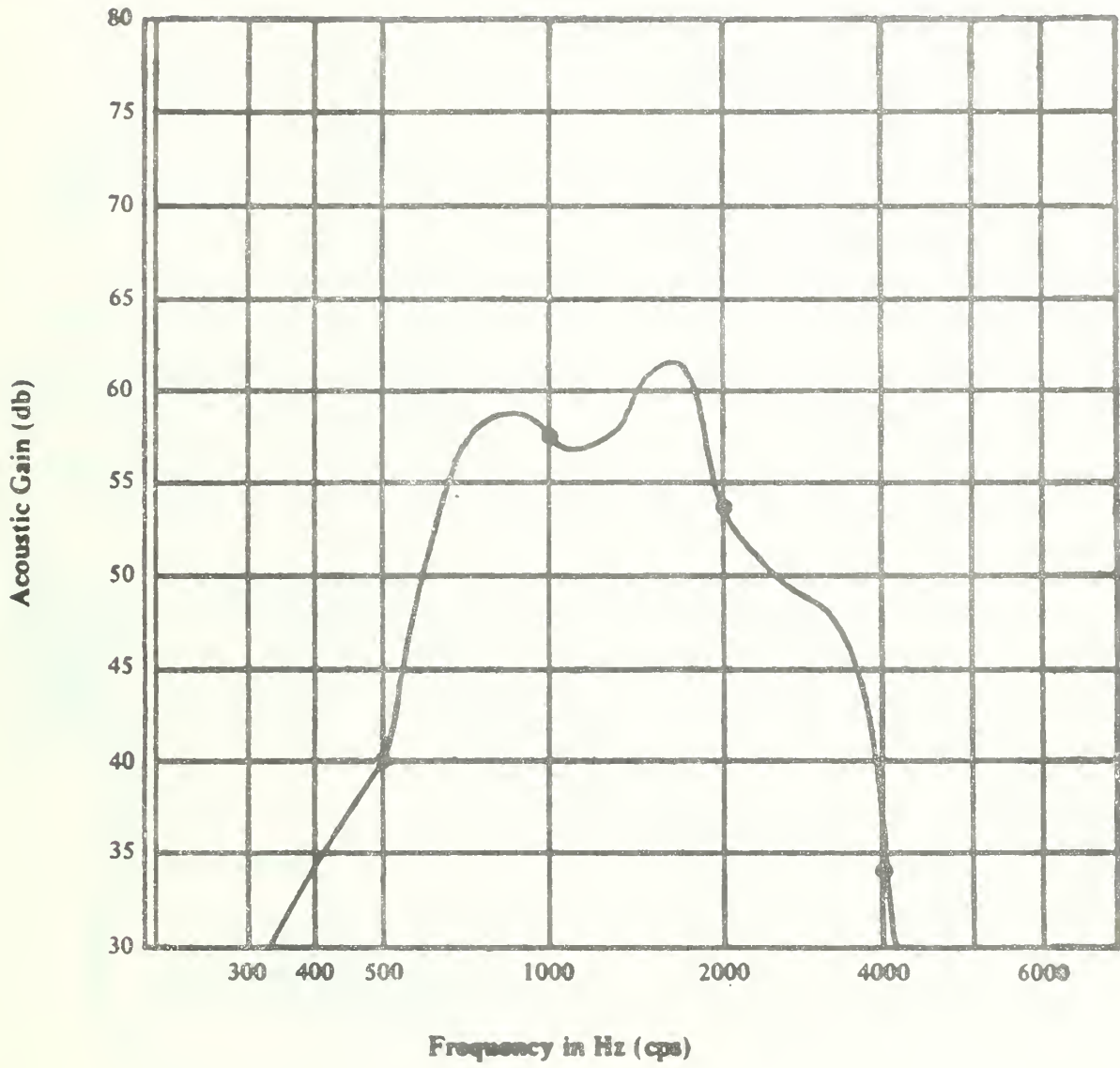
What is a hearing aid?

A hearing aid may be defined simply as a device that is used to bring sound to the ear and amplify it. Early hearing aids were non-electrical devices which served the first purpose -- that of collecting and bringing sound to the ear. The cupped hand behind the ear as well as devices such as ear trumpets and speaking tubes are examples of more effectively bringing sound to the ear. In addition to collecting sound, many of these devices were designed in such a way that they provided a degree of amplification. The development of vacuum tube amplifiers, and later transistor amplifiers, made possible the production of hearing aids that amplify sound a great deal. Most importantly, they are intended to amplify speech with as much clarity as possible.

How can hearing aid operation be described?

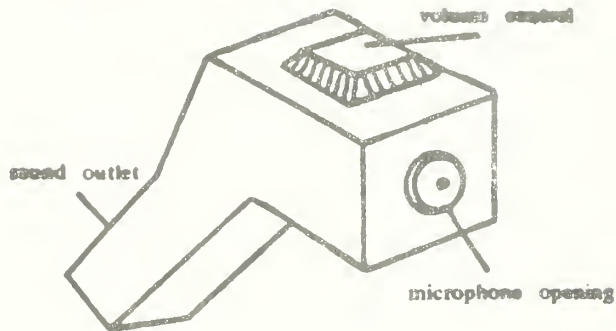
Hearing aid operation can be described in terms of the *gain*, *output* and *frequency response* of the instrument. The *gain* of an amplifier is the amount of amplification that a particular aid is designed to provide and is expressed in decibels. It might be thought of as an increase in loudness. Hearing aids can be classed as having either mild, moderate or strong gain. The *input* to an amplifier, in our case a hearing aid, can be anything: speech, noise, etc. Very simply, the *input* in decibels, *plus* the *gain* of the amplifier in decibels, *equals*

the *output* of the amplifier in decibels. The *maximum output* of an amplifier is the decibel level (sound pressure level) which the instrument will not exceed because of design limitations. The input level is controlled by the source -- whether you speak softly or whether you speak in a loud voice. Each hearing aid is designed to provide a maximum amount of gain, but this can be used in different amounts depending upon the volume control setting. A combination of input plus gain can never exceed the maximum output for which the instrument is designed. The *frequency response* of a hearing aid describes the amount of amplification provided by a particular instrument as one varies a constant input (pure tones) from very low frequencies to very high. Typically, the frequency response characteristics of a hearing aid are determined by setting the volume control at full on and using equal level pure tones as the input to the amplifier. The way in which the hearing aid amplifier responds in terms of its gain and output at the different frequencies describes its frequency response. The following graph shows a typical hearing aid response curve. Note that this aid has most of its gain between 500 Hz (cps) and 2000 Hz (cps.)

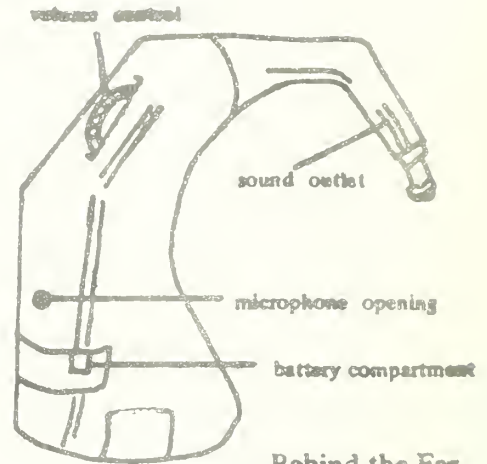


What types of hearing aids are available?

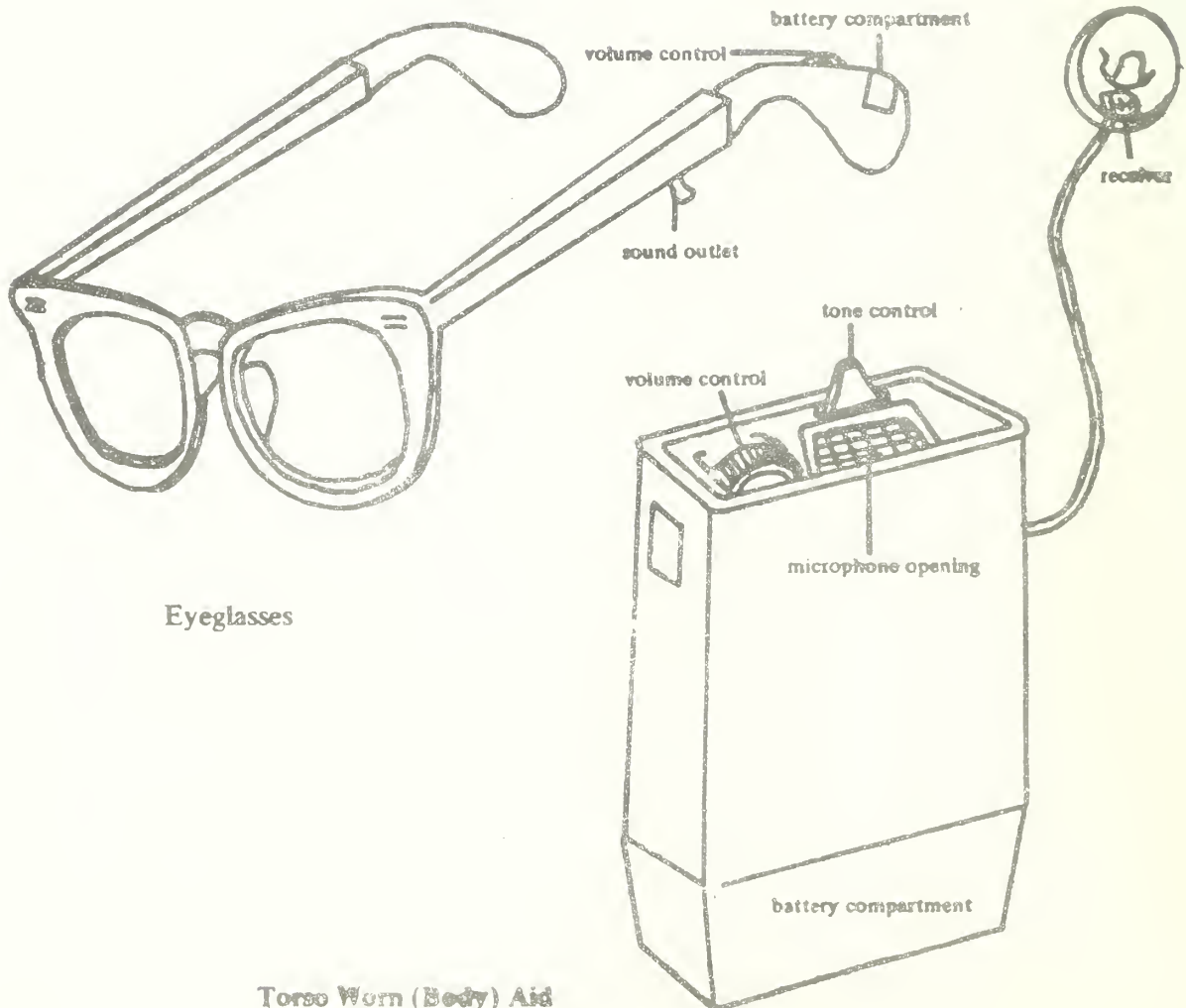
Hearing aids may be "all-in-the ear"; they may be worn behind-the-ear; they may be built into eyeglass temples; they may be torso, or body worn. The following drawings illustrate the four types and their basic parts.



All-in-the-Ear



Behind-the-Ear



Eyeglasses

Torso Worn (Body) Aid

How does the physical size of a hearing aid affect its operational characteristics?

Many major advances in hearing aid design have been in terms of the size and quality of the amplifier and its components. The smaller the hearing aid, the more difficult it is to build in enough stages of amplification to produce high power. As the size of the transducers (microphone and receiver) is reduced, the frequency response of such devices is restricted. Failure to isolate the microphone from the receiver when the two are mounted on the same chassis produce feedback problems. The smaller the hearing aid, the more difficult are the design problems. Because of these problems, high gain, very powerful hearing aids must still be built into what we know as torso, or body worn, hearing aids. This design allows the use of several stages of complex circuitry as well as effective isolation of the microphone from the receiver. Many modern torso worn hearing aids are still so powerful that nearly insurmountable feedback problems exist, particularly in the case of small children.

Why must so many children wear torso type hearing aids?

Many children have hearing losses that are so severe that only the most powerful hearing aids will provide enough amplification to allow them to hear the sounds of speech. Most ear level hearing aids are simply not powerful enough to provide this much amplification. Even if the young child could benefit from the use of an ear level instrument, his ears may be so soft and flexible that they would not

provide adequate support for an instrument worn on the ear. His active play may also contribute to the impracticality of the use of an ear level aid.

How should a torso type hearing aid be worn?

Torso type hearing aids should be worn in a harness, preferably one obtained from the hearing aid dealer for the particular model of hearing aid in use. It can be worn either underneath or on the outside of the clothing. The harness is desirable because it restricts the amount of movement to which the aid is subjected, thereby reducing noise generated by clothing rubbing on a hearing aid. The problem of clothing noise is reduced when the instrument is worn on the outside of the clothing. Worn under clothing, the hearing aid is certain to collect lint, while on the outside it may be subjected to the spilling of food and liquids. Periodic cleaning and servicing of the instrument will insure efficient and reliable operation. Some manufacturers provide plastic covers for their hearing aids that will effectively prevent spillage from getting into the microphone and controls of the instrument. Such devices will change the response characteristics of the hearing aid, so it is advisable to consult an audiologist to determine if the cover will significantly change the effectiveness of the instrument.

Are there some hearing aids for special types of problems?

The greatest recent advances in hearing aid design have been in the area of hearing aids for special uses. These advances include:

- (1) The addition of *automatic volume control* circuitry to the amplifier. Very simply, the addition of this type of circuitry enables the hearing aid amplifier to reduce the gain, output, or both, of the aid when the input is high level impact sound. Such a device is useful when one finds it difficult to tolerate such sounds. The use of automatic volume control circuitry imposes certain restrictions on other characteristics of the hearing aid, making its use sometimes undesirable.
- (2) *Low frequency emphasis* hearing aids. This rather recent development in hearing aids was intended to provide amplification in the extreme low frequency range for children with severe hearing losses whose residual hearing is in that range. The improved low frequency response is largely due to marked improvement in microphone and receiver design rather than changes in the amplifier itself. Hearing aids of this design have now been in use for a number of years, but their effect on the habilitation of the hearing impaired child will not be known until the children using them are old enough to respond to more sophisticated evaluations of hearing function, as well as the development of speech and language skills.
- (3) The CROS aid (*Routing of Signal*). This instrument was designed expressly to be used by persons with unilateral hearing losses. The hearing aid mounted in glasses has a microphone on the impaired side which feeds the signal through the eyeglass frame to an amplifier and receiver over the good ear. The sound is transmitted

to the good ear by means of an open plastic tube, enabling the user to hear more easily sounds presented to his impaired side. Since no earmold is worn, the good ear is not plugged and is able to hear the sounds naturally. One of the side benefits of such an arrangement is the fact that when this coupling to the ear is used, low frequency amplified sounds are markedly reduced in loudness. This has been a boon to persons whose hearing losses are characterized by normal hearing for low frequency sounds with losses in the mid and high range of frequencies. Such an instrument with the open tubing coupler to the ear relieves the user of unwanted, amplified, low frequency sound while leaving the ear open to hear such sound naturally.

Should one hearing aid or two be worn?

Generally speaking, the advantages of binaural hearing are: (1) localization of sound sources, and (2) the possible enhancement of the ability to understand speech when listening in a background of noise.

It has been shown that an individual can hear and understand speech adequately with one normal hearing ear. A great deal of research has been done on the merits of binaural versus monaural hearing aids, but none of it has proven conclusively that the use of binaural amplification is significantly better than monaural. There are, however, certain psychological benefits of binaural hearing that are difficult to quantify. It has been said that sound is more natural when listening with two ears and that listening is less fatiguing. Recommendations of

binaural hearing aids have in the past been based largely on subjective reaction to the use of two hearing aids. In the case of small children with torso worn hearing aids, Y-cords and receivers for each ear have been popular because they provide bilateral stimulation without the expense of a second hearing aid. The fact that both ears are stimulated with sound may be of benefit.

There is more recent evidence, based largely on observation by audiologist, parents and teachers, that the use of two torso worn hearing aids, one for each ear, provides substantially more benefit than a monaural instrument or a Y-cord arrangement. It is nearly impossible to compare the merits of two body worn hearing aids versus one in a clinical audiological evaluation. The parents and teachers of the hearing impaired child are in a much better position to make such observations and evaluations (over an extended period of time) while in daily contact with the child. Continued research of the problem may eventually provide the means of making such determinations in a clinical setting.

How long will a hearing aid last?

Given reasonable and proper care, a hearing aid should function adequately for a period of from three to six years. There are obviously many factors that effect the useful life of a hearing aid, such as the amount of abuse to which it is subjected, how much it is worn, the availability and quality of service, the durability of the particular model, etc.

Can a person's hearing loss become worse if he does not use a hearing aid? Will the use of a hearing aid damage hearing?

There is no evidence to suggest that if a hearing aid is not used an individual's hearing loss will become progressively worse. On the other hand, there are hearing aids that will amplify sounds to levels that are painfully loud and which are potentially damaging. Again, there is no evidence to suggest that persons wearing such hearing aids are exposed to extremely loud sounds often enough or long enough to actually cause a further loss of hearing.

What kinds of batteries are used in hearing aids?

There are a number of different types of batteries presently used in hearing aids. Almost without exception the manufacturer will recommend a particular type of battery and voltage requirements for a particular make and model of hearing aid. These recommendations should be followed without exception. In some cases, a particular hearing aid may be designed to be used with two different batteries, but the hearing aid dealer or the audiologist should specify which battery is to be used in any particular case.

Hearing aid batteries are manufactured by a number of firms. They are Eveready, Burgess, Mallory and Ray-O-Vac. Batteries are also available under the name of Beltone, Sears and Roebuck, Sonotone, Veterans Administration and Zenith. A given size and voltage battery may be available under any of the aforementioned brand names. For example, a

number 401 mercury battery is available from all nine sources.

Its designation would vary as follows: Eveready--E401E;
Belton--B401; Burgess--Hg401E; Mallory--RM-401H; Ray-O-Vac--R401;
Sears--8111; Sonotone--300; Veterans Administration--MN;
Zenith--ZM401. In each case, the battery voltage is the same,
only the designation differs.

Four basic types of batteries are currently utilized in hearing
aids:

1. *Carbon-Zinc*

This is well known as the typical flashlight battery. They are
rated at about 1.5 volts, the voltage decreasing as the cell is
used. The carbon battery can be used in a range of temperature
of -20 degrees Fahrenheit. The life of the battery, however,
will not be damaged by freezing. The primary disadvantage of
this type of battery is that one must increase the volume
setting of the hearing aid as the battery is used.

2. *Mercury*

Mercury batteries have a high ratio of energy to weight and size.
They are usually 1.35 volts when new. Their advantage is that the
voltage remains relatively constant during the life of the cell,
then drops sharply near the end of its useful life. It will give
good service over a temperature range of 40 degrees to 140 degrees
Fahrenheit. At temperatures below freezing (32 degrees F.) it will
give little service.

3. *Silver Oxide*

This battery provides higher voltages for a given size and weight than does the mercury battery. They are typically about 1.5 or 1.6 volts. They should not be used interchangeably with mercury batteries unless the manufacturer of the hearing aid indicates that it can be done. This silver oxide battery output is also sharply reduced at temperatures below freezing.

4. *Alkaline*

These batteries typically have a voltage of about 1.5 volts and like the carbon battery, there is a decrease in voltage as the battery is used. The reduction, however, is not as pronounced as in the carbon battery. When compared to a carbon battery of the same size, the alkaline battery has 50-100 per cent more initial energy. The primary advantage of the alkaline battery is its ability to perform with high efficiency under continuous demands. It is, however, a high cost battery.

Mercury, silver oxide and alkaline batteries all have excellent storage life in that they retain about 90 per cent of their service life over one year's storage at 70 degrees F. It has been suggested that storing batteries in the refrigerator will keep them fresh. There would appear to be little advantage to refrigerator storage since batteries have a long storage life anyway.

How long should a hearing aid battery last?

Technically, battery life is expressed in milli-ampere hours. The life of the battery is dependent upon the current requirements

of a particular hearing aid. Since most hearing aids differ somewhat in their circuit design, it follows that battery life will vary for each hearing aid. Manufacturers provide an estimate of the average battery life for each instrument they produce as well as the approximate cost per hour. Information concerning a particular hearing aid can be obtained by contacting an audiologist or your hearing aid dealer.

What type of earmold is best for a child?

Standard earmolds for use with both torso worn and early level aids are generally available in either the soft flex material or hard acrylic material. The use of either material will provide an effective acoustic seal and will effectively anchor the receiver to the ear. Soft flex molds are generally more comfortable and in the event of a blow to the ear, will cause much less discomfort. Earmolds and plastic tubing may tend to discolor somewhat with age, but this in no way limits their effectiveness.

How often should an earmold be replaced?

New earmold impressions should be taken and new molds made whenever the old mold fails to remain in place or whenever feedback, or squeal, becomes a problem. There is no specified interval for replacement, as the initial fit of the earmold and the child's rate of growth will vary considerably.

TROUBLE-SHOOTING THE MALFUNCTIONING HEARING AID

The following problems may be encountered in the day-to-day management of a child with a hearing aid.

1. Squeal or Feedback

This problem generally results from a poorly fitted, or improperly inserted, earmold. Sound leaking out of the ear is picked up by the hearing aid microphone, causing the feedback. It may also occur in the case of a powerful torso worn hearing aids if the instrument is worn too close to the receiver. This is *acoustic* feedback.

- a. Remove the aid from the ear and with volume nearly full on, place a fingertip over the earmold opening. If the squeal stops, the problem is in the earmold fit. It may need replacement.
- b. If the aid still squeals excessively, remove the earmold from the receiver, and place the fingertip over the receiver opening. If the squeal stops, the problem is in the coupling of the earmold to the receiver. New washers may solve the problem. If not, the coupling may be worn on either the earmold, receiver, or both. Replacement of the parts may be necessary.
- c. If, when a fingertip is placed on the receiver opening, feedback continues, the problem may be *mechanical* feedback within the body of the aid, or resonance from the receiver case. Your hearing aid dealer should be consulted.

- d. Repositioning of the hearing aid and harness may be necessary in order to obtain adequate isolation of the receiver from the microphone. (For example, if the receiver is in the left ear, the aid may need to be worn at a point low and to the right on the torso.)

2. Dead Aid. No Sound At All

- a. Check the battery, or try a new one. Note that the plus and minus signs on the hearing aid battery should correspond with the plus and minus signs in the battery compartment of the hearing aid. If the battery contacts in the battery compartment appear to be corroded, they can be cleaned or polished with an emery board or a small piece of sandpaper.
- b. Check the microphone-telephone switch. In the M, or microphone position, the instrument will operate normally and will respond to all sounds within its range. When set to the T, or telephone position, the instrument will respond only to sound transmitted over a telephone when the instrument is held near the telephone receiver or when within range of a classroom induction loop system. Some hearing aids have a combination TM setting which allows the use of both modes at the same time.
- c. Check the cord. Place the receiver in your ear and with the aid turned on, gently move and roll the cord between your finger tips. This should be done at two points -- near the receiver and near where the cord plugs into the hearing aid. A broken cord will be characterized by intermittent

functioning of the aid when this manoeuvre is done.

- d. Check the earmold. If the mold is plugged with earwax, it can be cleaned effectively with warm, soapy water and a pipecleaner. Care should be taken that no water remains in the sound conducting hold in the earmold or in the tubing that connects the earmold to some hearing aids. Alcohol should not be used to clean earmolds as it will dissolve some plastics.
- e. If none of the above efforts restore function, return the instrument to the dealer.

3. Weak or Distorted Sound

- a. Check the battery or try a new one. Check the battery contacts.
- b. Inspect earmold and tubing for partial plugging.
- c. Check tone controls and volume controls. A dirty volume control -- the output of the aid is weak and fairly constant as control is advanced -- is often to blame. This requires cleaning and servicing.
- d. Exposure to extremely cold temperatures will temporarily reduce the efficiency of transistor amplifiers and mercury batteries. When the instrument is warm, it will function properly. Modern hearing aids are designed ~~tot~~withstand a wide range of temperature extremes -- much more so than are likely to be encountered in this climate.

4. Intermittent Functioning

- a. Check the cord as above.
- b. Rotate volume and tone controls. Dirty controls may cause the problem. If this is the cause, the aid should be cleaned and serviced.
- c. Inspect battery contacts.

What kinds of emergency supplies for hearing aids might be kept in the classroom?

Parents should provide replacement cords and spare batteries for each child's hearing aid. In addition, the teacher can maintain a supply of pipecleaners and an emery board or sandpaper for cleaning batteries and battery contacts and earmolds. Temporary repairs to a hearing aid case or battery compartment can be made with scotch tape until such time as the aid can be returned to the dealer for repair.

How can personal hearing aids and auditory training units be compared?

Auditory training units are essentially large, desk model hearing aids. They may have multiple receivers for a number of children. The receivers may be earphones of the insert type as worn with personal hearing aids. Typically, they provide a more variable frequency response (tone control) and output not often available in smaller aids. The quality of sound reproduction may be improved over that found in personal aids, but they are not necessarily more

powerful. They may also incorporate turntables for playing records. Auditory training units are subject to the same problems found in any other electronic amplifier. They are often large, however, and may be more easily checked and repaired by a qualified electronic serviceman. If battery powered, spare batteries should be kept on hand, as they may not be readily available from usual sources of supply such as drug stores and hearing aid dealers. They often need to be specially ordered from electronic supply houses.

For further information, reference may be made to Davis and Silverman's **Hearing and Deafness** which is widely recognized as an excellent and comprehensive book concerning all aspects of hearing impairment. It includes much detailed information about hearing aids.

GLOSSARY OF TERMS RELATING TO CHILDREN
WITH HEARING PROBLEMS

Adventitiously Deaf - The child or adult who becomes deaf through accident or illness after he has developed normal language and speech patterns.

Audiogram - a graph that provides a picture of the amount of hearing. The hearing level is recorded in decibels (loudness) for each frequency (pitch) tested.

Audiology - a profession that involves the science of hearing.

Audiologist - an individual qualified to test hearing and make recommendations concerning the use of hearing aids.

Audiometer - an instrument used to test hearing.

Bilateral Hearing Loss - hearing loss in both ears.

Conductive Hearing Loss - result of reduced conduction of sound through the outer and/or middle ear to the inner ear. This type of hearing loss is primarily a medical problem which in the majority of cases, can be cleared by treatment.

Congenital Hearing Loss - a hearing impairment which exists at the time of birth.

Hearing Impairment -

a) Mild Hearing Loss (15 db - 30 db) -

The child with this type of sensory-neural loss will usually learn speech through hearing. He may find a hearing aid helpful.

b) Moderate Hearing Loss (35 db - 60 db) -

The child with this type of sensory-neural hearing loss usually receives enough of a pattern through hearing with the help of amplified sound to learn language. Special education is usually required to establish good speech patterns and full language development.

c) Severe Hearing Loss (65 db - 75 db) -

The child with this type of sensory-neural loss usually does not receive enough of a pattern through hearing, even with the help of amplified sound, to spontaneously develop language and speech.

d) Profound Hearing Loss (80 db -) -

In order to acquire language this child requires special education by teachers trained to educate deaf children.

Mixed Hearing Loss - a combined conductive and sensory-neural hearing loss.

Sensory-Neural Hearing Loss - this type of hearing loss is often referred to as nerve deafness.

These hearing impairments cannot be cured by medical treatment, but may

be partially compensated for through special education and use of amplification.

Unilateral Hearing Loss - hearing loss in one ear only.

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Additional copies of this booklet are available on request. If additional copies are required by you or your organization, please forward your request to the appropriate address:

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